

REMARKS

Claims 1-20 were all the claims pending in this application when the August 13, 2009, office action was mailed.

I. Preliminary Matters. Claims 14-19 were finally withdrawn from consideration as directed to non-elected Groups I and II described in the July 31, 2008, restriction and election of species requirement, and have been canceled above.

II. Summary of the Office Action. In the office action:

(a) The requirement that claims 14-19 be withdrawn from consideration was made final;

(b) The rejections based on the first and second paragraphs of 35 USC 112 and the rejection under 35 USC 103(a) as being obvious over Reith, et al. WO 01/74990 (being all the rejections made in the November 12, 2008, office action) were withdrawn "in view of the persuasive arguments submitted by Applicants";

(c) Claims 9 and 20/9 were rejected because the requirements for synthesizing oil were not in the claim; and

(d) Claims 1-13 were rejected as obvious over US patents 4236349 to Ramus and 4417415 to Cysewski, et al., each alone, further in view of Reith, et al. WO 01/74990.

III. Amendments. As noted above, claims 14-19 have been canceled. Claim 9 has been amended to add the limitation that the maintaining step is carried out with high initial nutrient concentrations but limited nitrogen availability, so that initial conditions of high light intensity and high nutrient concentrations favor continued exponential growth for a short period, but growth becomes limited by nitrogen availability which inhibits protein synthesis, whereby oil content is increased. Basis is provided by originally filed claim 14, lines 27-33; page 11, lines 3-7; and page 19, lines 28-32.

IV. Rejection of Claims 9 and 20/9 Under 35 USC 112, first paragraph, for lack of enablement.

It is respectfully submitted that the above amendment to claim 9, incorporating the oil synthesis limitation from original claim 14, overcomes the rejection of claims 9 and 20/9 for lack of enablement, so that this rejection must be withdrawn.

V. Rejection of Claims 1-13 Under 35 USC 103(a).

The office action stated at page 6 that "It would have been *prima facie* obvious to one of ordinary skilled [sic] in the art to employ the processes of Ramus, U.S. 4,236,349 or Cysewski et al., 4,417,415 for the closed system process of Reith et al to obtain the advantages for increasing the yield of the biomass. Both Ramus and Cysewski et teach the culturing in the first stage of a closed system to culture photosynthetic microbes in the presence of sufficient carbon dioxide as taught by Ramus which is 5% as required by the claims or by Cysewski et al which is at least about 3% whereby both Ramus and Cysewski et al teaches the same results of increasing the yield of doubling the mass within about 16 hours."

Initially, it must be noted that the reference to "sufficient carbon dioxide as taught by Ramus which is 5% as required by the claims" stated above is erroneous. The "5%" required by the claims does NOT refer to carbon dioxide, but rather refers to culturing a biomass of "5% of said open system's carrying capacity" for inoculation into the open system. Claim 1, lines 10 and 13; claim 9, lines 10 and 13; claim 10, line 11; claim 12, lines 9 and 11; and claim 13, lines 12 and 14. The claims do not contain any reference to 5% except for the

above. None of Ramus, Cysewski and Reith discloses or suggests this limitation of inoculating an initial biomass of 5% of an open system's carrying capacity into that open system. Thus, the obviousness rejection is not directed to limitations in the claims and therefore must be withdrawn.

Further, Ramus does not render the present invention obvious for the same reasons that Reith et al does not render the invention obvious. In the office action, the rejection of the claims as obvious over Reith et al was withdrawn "in view of the persuasive arguments submitted by Applicants." Those persuasive arguments with respect to obviousness (on pages 23-24 of the May 15, 2009, response) were that:

(1) ". . . Reith teaches that the algae concentration must be maintained at a constant, optimal level, by exponentially increasing the surface area through increasing the number of downstream elements, or through increasing the reactor volume by adding culture medium or waste water containing nutrients", whereas "In stark contrast, as explained on page 18, line 33, to page 19, line 22, the present invention requires that the algal concentration change from an original 5% of

carrying capacity, to 90% of carrying capacity, without increasing surface area"; and

(2) ". . . because Reith undoubtedly teaches the necessity to maintain a constant optimal algal concentration through exponentially increasing surface area, it is a surprising, unpredictable and unexpected result that high productivity can be achieved by exactly the opposite - the present invention's highly varying concentration (from 5% to 90% in 5 days) without exponentially increasing surface area."

Just as in Reith, Ramus requires maintaining algal concentration at a constant, optimal level: col. 2, lines 55-57, state that "variations in the first stage growth rate are minimized by maintaining the cell density in the first stage at a designated level." Col. 8, lines 63-64, state "cell density is maintained substantially constant to approach the steady-state growth condition."

Just as in Reith, Ramus teaches maintaining a constant algal concentration by adding culture medium: col. 2, lines 59-67, state "Fresh nutrient medium is added to the first stage and algae culture transferred from the first stage to the second stage in response to an increase in the first stage cell density. Thus, as

the cell density tends to increase above the desired level, the influx of fresh nutrient and the withdrawal of culture tend to maintain the cell density substantially constant." Col. 8, lines 59-62, teach "adding fresh nutrient medium and concomitantly withdrawing culture medium from the first stage as the cell density starts to increase above a designated level." Because Reith's teaching of maintaining a constant optimal cell density by adding nutrient medium has already been found not to render the present invention obvious, Ramus' identical teaching of maintaining a constant optimal cell density by adding nutrient medium also cannot render the present invention obvious. And the following argument from page 24 of the May 15, 2009, response applies to Ramus just as surely as it applied to Reith: "the surprising, unexpected and unpredicted higher productivity from the present invention's highly varying concentration (from 5% to 90% within 5 days) is the key to the present invention's solving the decades-long contamination problem of open systems . . . by dominating any potential contaminants."

Because Ramus alone does not render the present invention obvious for the same reasons that Reith alone

did not render the invention obvious, and because the "5%" required by the present claims does not relate to carbon dioxide (but relates to inoculating an open system with an initial biomass of 5% of the carrying capacity of that open system, which is not disclosed or suggested by either Ramus or Reith) the combination of Ramus and Reith cannot render the invention obvious either.

Thus, Ramus and Reith, whether alone or in combination, do not render the present invention obvious, so the obviousness rejection based on Ramus and Reith must be withdrawn, especially because the present invention achieves "the surprising, unexpected and unpredictable result of overcoming the decades-long contamination problem of open ponds."

Turning to the obviousness rejection based on Cysewski and Reith, in its recitation of the teaching of Cysewski, the office action repeatedly emphasized the carbon dioxide content of the gas. As shown above, in its recitation of the teaching of Reith, the office action emphasized the carbon dioxide content of the gas.

However, as also shown above, the "5%" in the claims relates to the percentage of the carrying capacity of the open system, not the carbon dioxide

content of the gas. Thus, the obviousness rejection is not directed to the limitations in the claims, and therefore must be withdrawn (just as with the obviousness rejection in view of Ramus and Reith).

Further, this rejection of the claims as obvious from Cysewski in view of Reith (aside from the rejection from Ramus in view of Reith, discussed above), stated on page 6 that ". . . Cysewski et al teach the culturing in the first stage of a closed system to culture photosynthetic microbes in the presence of sufficient carbon dioxide as taught . . . by Cysewski et al which is at least 3% whereby . . . Cysewski et al teaches the same results of increasing the yield of doubling the mass within about 16 hours." However, it is respectfully submitted that Cysewski, whether alone or combined with Reith, cannot render the present invention obvious because the present invention teaches directly against Cysewski. The present invention teaches that the algae is maintained for a period of less than 5 days. Page 17, line 30; page 19, lines 6, 10, 21 and 27; page 21, line 15; claim 1, line 19; claim 9, line 19; claim 10, line 17; claim 12, line 17; and claim 13, line 20. By contrast, col. 7, lines 27-32, of Cysewski states that "maximum cell density will be achieved

within 14 days . . . terminating the culturing after about 10-14 days" and col. 9, lines 53-57, states "After approximately 12 days the cell density should have reached a maximum . . . at which point the entire culture is subjected to the extraction procedure" The present invention's maintaining the algae culture for 5 days or less teaches directly against Cysewski's termination of terminating or extracting the culture after 10 to 14 days, and therefore Cysewski, whether alone or combined with Reith, cannot render the present invention obvious.

The office action then went on to state "If there are any differences with respect to the claimed subject matter and the general knowledge pertaining to the art in the area, that these differences would have been *prima facie* obvious to one of ordinary skilled [sic] in the pertinent art whether it was based on the art of record or claimed subject would have [been] obvious for the 'combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results'; since the reference teaches various micro-organism for culturing algae having a high productivity and biomass by controlling the growth rate by controlling the amount of carbon

dioxide and flow from the closed to open systems one would reasonably expect to obtain the same results of increasing the biomass which renders the instant claims obvious absent a showing of unexpected results."

Again, it must be noted that this statement focuses on "the amount of carbon dioxide", but the limitations in the claims relate to the amount of inoculum as a percentage of the carrying capacity of the open system.

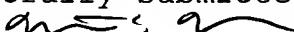
However, it is crystal clear that the differences of doubling in biomass in 16 hours or less, and inoculating at least 5% of carrying capacity, do indeed provide unexpected results, and certainly do "more than yield predictable results." Indeed, these differences solve the long felt but unmet need for a solution to the decades-long problem of contamination in open ponds.

As described on page 18, line 33, to page 19, line 32, the surprising, unexpected and unpredicted higher productivity from the present invention's highly varying concentration (from 5% to 90% within 5 days) is the key to the present invention's solving the decades-long contamination problem of open systems (described on page 9, line 25, to page 11, line 32) by dominating any potential contaminants.

Therefore, the obviousness rejection must be withdrawn because the present invention's highly varying algal concentration (5% to 90% in 5 days due to the doubling of biomass in 16 hours and 5% inoculation) are directly contrary to Ramus' and Reith's teaching of constant algal concentration, and Cysewski's teaching of culturing for 12 to 14 days, thereby achieving the surprising, unexpected and unpredictable result of overcoming the decades-long contamination problem of open ponds.

VIII. Conclusion. In view of the above, it is respectfully submitted that this application is now in condition for allowance, and an early action to that effect is earnestly solicited. If the claims would be in condition for allowance except for minor revisions, Applicant's attorney courteously invites a telephone interview initiated by the Examiner so that such revisions can be effected by Examiner's amendment.

Respectfully submitted,


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